Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Amendment of the Commission's Rules to Promote Aviation Safety	)	WT Docket No. 19-140
	)	
	)	

REPLY COMMENTS OF THE WIMAX FORUM

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EXECUTIVE SUMMARY

The Commission should promptly adopt service rules for the Aeronautical Mobile Airport Communications System, better known as AeroMACS.

The record confirms the momentum for AeroMACS. Commenters of all stripes – airline, airport, airframe manufacturer, and aeronautical communications network provider stakeholders, among others – reiterate the benefits of AeroMACS and support the adoption of service rules for the use of this technology.

Commenters also support the adoption of a flexible, light-touch approach for regulating AeroMACS. To this end, the vast majority of commenters recognize that a Channel Manager will help maximize efficient and flexible usage of this spectrum to meet the unique needs at each airport. Commenters also recognize the wisdom of identifying a single, nationwide entity to serve in this role. A single entity will ensure consistency in the allocation and use of the available channels and will provide one point of contact to facilitate sharing with other authorized users of the bands.

The record also reflects the need to identify eligibility criteria for the Channel Manager. To ensure that all expected beneficiaries of AeroMACS can access this service, impartiality should be one of the criteria required of the Channel Manager.

A licensed-by-rule regime will lower barriers for the deployment of AeroMACS facilities. Commenters resoundingly state that the *Notice's* proposed licensing and coordination requirements would impose onerous and unnecessary costs on users. These costs could constrain the deployment of AeroMACS facilities. The Commission instead should pursue a more flexible licensed-by-rule approach while empowering the Channel Manager to serve as the central source of AeroMACS usage. Such an approach would best facilitate deployment of AeroMACS systems while also achieving the Commission's objective of being able to quickly identify non-Federal users in the band in the unlikely event of interference.

The overwhelming majority of commenters also support more flexible eligibility rules. The restrictive eligibility rules proposed in the *Notice* would potentially preclude certain expected users of AeroMACS networks from enjoying the benefits of this service. As a result, opposition to this proposal is nearly unanimous. The Commission instead should pursue a more permissive approach that allows use by airports, airline carriers, aeronautical communications network providers, and other users whose communications are for the purpose of promoting safety and regularity of flight.

Finally, the Commission should disregard proposals from a small handful of aeronautical mobile telemetry ("AMT") commenters who seek a "re-do" of the Commission's carefully considered approach for introducing AeroMACS. The Forum continues to engage with members of the flight test community regarding an approach to cooperation that would be generally applicable to all airports at which AMT operations occur. However, in lieu of presenting suggestions on how to facilitate such cooperation, these AMT commenters propose a series of road blocks designed to constrain AeroMACS services.

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The WiMAX Forum ("WiMAX Forum" or "Forum"), by its attorneys, submits these reply comments to the *Notice of Proposed Rulemaking* in this proceeding proposing service rules for the Aeronautical Mobile Airport Communications System, better known as AeroMACS.[1]

I. INTRODUCTION

The WiMAX Forum is leading efforts to advance the development and deployment of AeroMACS. As part of this, the Forum petitioned the Commission more than two years ago to initiate this proceeding.[2] The proposals contained in the Petition were informed by the Forum's proactive efforts to engage with the AeroMACS ecosystem and build consensus among stakeholders.[3] These proposals focused on lowering barriers to entry, maximizing the efficient

[1] *Amendment of the Commission's Rules to Promote Aviation Safety*, Notice of Proposed Rulemaking, 34 FCC Rcd 4984 (2019) ("*Notice*").

[2] WiMAX Forum Petition for Rulemaking to Adopt AeroMACS Service Rules, RM-11793 (filed Mar. 31, 2017) ("Petition").

[3] *See, e.g.*, Letter from Claude Pichavant, Senior Expert Communications & Surveillance, Airbus Operations S.A.S., to Marlene H. Dortch, Secretary, FCC, RM-11793, at 3 (filed Aug. 17, 2017) ("Finally, Airbus wishes to express its deepest appreciation to the WiMAX Forum for its continued leadership in AeroMACS on a worldwide level."); *see also* Letter from Eugene Crozier, Powertech Labs Inc., to Marlene H. Dortch, Secretary, FCC, RM-11793, at 2 (filed Aug. 15, 2017); Letter from Michel Jabbour, Business Segment Manager CI, Siemens Industry, to Marlene H. Dortch, Secretary, FCC, RM-11793, at 3 (filed Aug. 16, 2017); Letter from Brian Crowe, Talus Atomics Corporation, to Marlene H. Dortch, Secretary, FCC, RM-11793, at 3 (filed Aug. 16, 2017); Letter from Mark Altshuller, CTO, Telrad Networks, to Marlene H. Dortch, Secretary, FCC, RM-11793, at 3 (filed Aug. 17, 2017); Letter from Geoffrey Noakes, VP, Business Development, Symantec Corporation, to Marlene H. Dortch, Secretary, FCC, RM-11793, at 3 (filed Aug. 17, 2017); Letter from Oscar G. Marcia, Chief Executive Officer, Eonti Inc., to

and fair utilization of the spectrum, and allowing the marketplace and technological developments to determine the highest and best uses of AeroMACS. The Forum's proactive, consensus-building efforts paid dividends by generating a record – in response to the Petition – that was overwhelmingly supportive of the proposed framework.[4]

The instant record – in response to the *Notice* – is striking for two reasons. First, it confirms the momentum for AeroMACS. Commenters of all stripes – airline, airport, airframe manufacturer, and aeronautical communications network provider stakeholders, among others – reiterate the benefits of AeroMACS and support the adoption of service rules for the use of this technology.

And second, the instant record reiterates the significant support for the proposals contained in the Forum's Petition. A majority of commenters again confirm the wisdom of a flexible, light-touch regulatory approach for this service. To implement the views expressed in this record, the Commission should adopt rules that:

- Utilize a single, nationwide Channel Manager to maximize the efficient, consistent, and effective use of AeroMACS frequencies;
- Identify eligibility criteria for the Channel Manager;
- Employ a licensed-by-rule approach; and
- Allow for AeroMACS communications by a range of users, including airports, airlines, and aeronautical communications network providers.

These actions will best advance the public interest by expediting the availability of AeroMACS to all of the expected users of this service.

Marlene H. Dortch, Secretary, FCC, RM-11793, at 3 (filed Aug. 17, 2017); Letter from Frank O'Connor, Chief Executive Officer, Airtel Inc., to Marlene H. Dortch, Secretary, FCC, RM-11793, at 3 (filed Aug. 18, 2017).

[4] Reply Comments of WiMAX Forum, RM-11793, at 3, 11-14 (filed Sept. 5, 2017) ("Forum Reply Comments").

The Commission should not, however, be distracted by proposals from a small handful of aeronautical mobile telemetry ("AMT") commenters who seek a "re-do" of the Commission's carefully considered approach for introducing AeroMACS. The Forum continues to engage with members of the flight test community regarding an approach to cooperation that would be generally applicable to all airports at which AMT operations occur. However, in lieu of presenting suggestions on how to facilitate such cooperation, these AMT commenters propose a series of road blocks designed to constrain AeroMACS services. The Commission should reject these proposals.

II. A BROAD AND DIVERSE SET OF COMMENTERS RECOGNIZE THE BENEFITS OF AEROMACS AND THE NEED FOR PROMPT ADOPTION OF SERVICE RULES

The adoption of AeroMACS by the global aviation community reflects the need to establish a new framework for airport surface communications.[5] While the full range of potential use cases and applications are still being developed, the FAA already has identified over 330 applications for AeroMACS.[6] These applications will improve Air Traffic Management, relieve traffic congestion, reduce delays, improve airport safety, minimize the environmental impact of flying, and reduce costs for airport and airlines, allowing the resulting savings and benefits to be passed on to consumers.

[5] *See* Petition at 6-9; Comments of WiMAX Forum, at 1-3 (filed Sept. 3, 2019) ("Forum Comments"). Unless otherwise noted, all comments cited herein were filed on or about September 3, 2019 in WT Docket No. 19-140.

[6] *See, e.g.*, James Budinger, FAA, *Aeronautical Mobile Airport Communications System (AeroMACS) for Access to SWIM*, at 7-11 (Nov. 3, 2010) ("*Access to SWIM*") (noting that over 330 applications have been identified), https://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/atc_comms_services/swim/documentation/media/demo_tim_6/10_TIM6%20AeroMACS%20Budinger%20Rev1%2003-Nov-2010.pdf.

In response to the *Notice*, entities representing a broad cross section of industries and perspectives filed comments. Notably, the need for AeroMACS is unrefuted in the record,[7] and support for adoption of service rules is nearly unanimous.

Equally important, the record is comprised of commenters hailing from virtually every corner of the AeroMACS ecosystem. Indeed, the record contains input from stakeholders representing airlines, airports, airframe manufacturers, aeronautical communications network providers, and AeroMACS equipment manufacturers, among others. Aviation Spectrum Resources, Inc. ("ASRI") reiterates its support for the introduction of AeroMACS as a "means to augment and support existing [aeronautical mobile route service] communications for aviation safety."[8] The Airports Council International-North America ("Airports Council") similarly states its support for the adoption of AeroMACS service rules.[9] Airbus notes AeroMACS was adopted by the global aviation industry to address "demand for high-bandwidth, data intensive services and applications" on the airport surface[10] and urges the Commission to adopt service rules "as soon as possible."[11] Collins Aerospace similarly voices its support for AeroMACS service rules.[12] And numerous other interested stakeholders, including AeroMACS equipment manufacturers, certification bodies, and network engineering firms, record similar support.[13]

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[7] Indeed, even those handful of commenters representing AMT interests acknowledge the need for AeroMACS. *See* Boeing Comments at ii ("Boeing recognizes the need for AeroMACS services….").

[8] Comments of Aviation Spectrum Resources, Inc. ("ASRI") Comments at 7.

[9] Airports Council International-North America Comments at 1 ("Airports Council Comments"). The Forum understands that the Airports Council Comments were inadvertently filed in the docket established for the Petition (RM-11793), a docket which the Commission closed upon adoption of the *Notice*. The Forum thus requests Commission consideration of the Airports Council's comments in the instant docket.

[10] Airbus Comments at 2.

[11] *Id*. at 3.

[12] Collins Aerospace Comments at 7.

[13] *See* Comments of Air Line Pilots Association, International ("ALPA") at 4; American Association of Airport Executives ("AAAE") Comments at 1; Airlines Electronic Engineering Committee ("AEEC") Comments at 3; Telrad Comments at 2; Selex ES Comments at 1; DigiCert Comments at 1-2 (filed as Geoffrey W. Noakes);

Safety and regularity of flight are two of the chief public interest benefits commenters cite. The Airports Council states that the adoption of service rules for AeroMACS "will provide safety benefits to airport operators, airside ground vehicle operators, flight operators, and the traveling public."[14] Similarly, the ALPA notes the aviation industry has been increasing connection with data networks for "the transmission of safety-of-flight-information such as flight dispatch releases, weather information, and Notice to Airmen messages" and that AeroMACS "shows promise as a potential broadband channel to provide similar connectivity while at the airport."[15] And Airbus states its intent to utilize AeroMACS moving forward "to ensure safety for the traveling public and to promote increased efficiencies."[16] Of course, the Commission repeatedly has acknowledged the safety and regularity of flight benefits of AeroMACS. The most recent instance of this occurred in the *Notice*, in which the Commission noted AeroMACS will help "enhance safety and reduce flight delays" as well as support "air traffic management, including air traffic control; aeronautical operations communications; and communications related to airport operations, safety, and security."[17]

The record further reflects the growing momentum for AeroMACS.[18] Airbus, for instance, notes it already has accounted for "AeroMACS integration in [its] future aircraft architectures" and that its main avionics supplier already has commercial AeroMACS kits

Comments of Eonti at 5 (filed as Oscar G. Marcia); ConvergEX Comments at 2-3; CelPlan Comments at 5; Airtel Comments at 1-2; Powertech Comments at 1-2 (filed as Eugene Crozier); Comments of Brian Crowe at 2 ("TELE-WORX Comments"); Ondas Networks Comments at 1.

[14] Airports Council Comments at 2.

[15] ALPA Comments at 4.

[16] Airbus Comments at 3.

[17] *Notice*, 34 FCC Rcd at 4997 ¶ 34.

[18] *See* Forum Comments at 6-8 (discussing the growing momentum for AeroMACS both in the United States and internationally).

available.[19] The Airports Council similarly states that a number of its members already have utilized "or are actively considering utilizing AeroMACS to provide secure, high bandwidth wireless communications links."[20] The AAAE notes interest from its members as well.[21] And Siemens tells of its efforts to "bring AeroMACS to the marketplace" and its continuing "invest[ment] in AeroMACS technology not only in the United States, but globally as well."[22] To facilitate the deployment of AeroMACS facilities and realize the aforementioned benefits, however, the Commission must move expeditiously to adopt final rules authorizing AeroMACS.

III. COMMENTERS OVERWHELMINGLY SUPPORT A FLEXIBLE, LIGHT-TOUCH REGULATORY APPROACH FOR AEROMACS

In its Petition, the Forum proposed service and eligibility rules intended to afford interested AeroMACS users with ongoing flexibility to adapt their use of this service to future marketplace and technological developments.[23] Recognizing that AeroMACS is still in its nascent stages, the Forum sought to avoid overly specific and prescriptive rules that could unintentionally constrain the deployment of AeroMACS systems and chill innovation in new applications. These proposed rules were informed by the Forum's efforts to advance the deployment of this technology through engagement with the AeroMACS ecosystem. The Forum's proactive, consensus-building efforts paid dividends by generating a record – in response to the Petition – that supported the proposed framework. In response to the *Notice*, an

[19] Airbus Comments at 2.

[20] Airports Council Comments at 1.

[21] AAAE Comments at 1.

[22] Siemens Reply Comments at 1 (filed Sept. 26, 2019) (filed as Joel Greene).

[23] *See* Petition at 14-22.

overwhelming majority of commenters again reiterate the need for a flexible, light-touch regulatory approach for AeroMACS.

A. The Record Reflects Support for the Utilization of a Single Channel Manager to Maximize Efficient, Consistent, and Effective Use of AeroMACS Frequencies

The most significant aspect of the record is the overwhelming appreciation for the public interest benefits of utilizing a single Channel Manager to allocate access to AeroMACS frequencies. The vast majority of commenters recognize that a Channel Manager will help maximize efficient and flexible usage of this spectrum to meet the unique needs at each airport. For example, the AAAE states a Channel Manager will "maximize the use of AeroMACS spectrum and ensure its fair access to all prospective users."[24] Airbus adds that a Channel Manager "is best positioned to allocate spectrum fairly, efficiently and on a non-discriminatory basis" for each specific location.[25] And ConvergEX notes that a Channel Manager "will ensure the efficient use of AeroMACS spectrum by employing sharing approaches tailored to the needs … at each airport."[26]

The record also reflects widespread support for designating one entity to serve as a nationwide Channel Manager. For instance, the AEEC states that coordination of AeroMACS spectrum "is best performed by a single industry channel manager."[27]

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[24] AAAE Comments at 2.

[25] Airbus Comments at 3.

[26] ConvergEX Comments at 2 ("This coordination will ensure the efficient use of AeroMACS spectrum by employing sharing approaches tailored to the needs of the federal and non-federal AeroMACS users at each airport."); *see also* Collins Aerospace Comments at 7 (recognizing benefits of a third-party Channel Manager approach); ASRI Comments at 8 (same); ALPA Comments at 4 (same); Ondas Comments at 2-3 (same); TELE-WORX Comments at 2-3; Powertech Comments at 3-4 (same); Airtel Comments at 2-3 (same); CelPlan Comments at 3 (same); Eonti Comments at 2-3 (same); DigiCert Comments at 1, 3-4 (same); Selex ES Comments at 2 (same); Telrad Comments at 1-2 (same); Airbus Comments at 2-3 (same); AEEC Comments at 2 (same).

[27] AEEC Comments at 2; *see also* AAAE Comments at 2 (supporting a single, nationwide channel manager); Telrad Comments at 1 (same); Selex ES Comments at 2 (same); DigiCert Comments at 3 (same); Eonti Comments at 2 (same); ConvergEX Comments at 3 (same); CelPlan Comments at 3 (same); Airtel Comments at 2 (same);

Commenters identify several benefits for this approach. Selex ES states that a single, nationwide entity will ensure consistency for accessing AeroMACS channels.[28] As the Forum previously noted, such nationwide consistency will help end users avoid having to deal with different allocation and interference procedures at each airport.[29] Numerous parties also explain that a single Channel Manager will simplify the utilization of AeroMACS frequencies by providing end users with one entity with whom to interact.[30] This simplified approach will especially benefit airlines by providing one single point of contact for all airports.[31] Consistent with this view, the ALPA states that the use of a single entity to manage frequency assignment in other contexts has resulted in "simplified procedures[] and avoided . . . more complex logon and handoff procedures."[32] In addition, commenters also affirm that a single Channel Manager will facilitate coordination with other authorized users of the band.[33]

In sum, the record reflects that a single Channel Manager will enable coordination among eligible non-Federal users of the AeroMACS bands, ensure nationwide consistency in the allocation and use of the available channels, and provide a single point of contact to facilitate sharing of the AeroMACS bands with Federal AeroMACS users and AMT users in a manner that will avoid interference. The WiMAX Forum believes, for these reasons, that the approach to Channel Manager coordination proposed in the Petition is the most efficient and will be the most

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Powertech Comments at 3 (same); TELE-WORX Comments at 3 (same); Ondas Comments at 2 (same); Collins Aerospace Comments at 7 (same);

[28] *See* Selex ES Comments at 2; *see also* Eonti Comments at 3; ConvergEx Comments at 3.

[29] *See* Forum Reply Comments at 12-13.

[30] *See* Ondas Comments at 2; TELE-WORX Comments at 3; Powertech Comments at 3; Airtel Comments at 2.

[31] *See* Forum Reply Comments at 13.

[32] ALPA at 4.

[33] *See* AAAE Comments at 2; Airbus Comments at 2.

effective means for assuring that the important benefits of AeroMACS are realized by Federal and non-Federal members of the aviation community.

B. The Record Reflects the Need for an Impartial Channel Manager to Manage AeroMACS Frequencies on a Non-Discriminatory Basis

AeroMACS stakeholders also support the Forum's proposed eligibility criteria for the Channel Manager designee.[34] Impartiality is the most commonly cited criterion commenters identify. The AAAE urges the Commission to appoint "an impartial expert" as the Channel Manager "to ensure non-discriminatory and fair management of AeroMACS channels."[35] Collins Aerospace shares similar sentiments, recommending that the Commission designate "an independent, neutral third party" to manage frequency coordination.[36] Consistent with this view, CelPlan urges the Commission to designate "[a]n independent not-for-profit" Channel Manager.[37] And ConvergEX adds that the Channel Manager should be a "non-profit[,]" "impartial and an expert in AeroMACS technology."[38] Moreover, no commenters object to any of the eligibility criteria proposed by the Forum.[39]

Other comments from ASRI and AMT interests further highlight the importance of impartiality in the Channel Manager. ASRI – in its discussion of the eligibility rules – notes that giving control of AeroMACS frequencies to airport owners "can create perverse incentives to

[34] *See* Petition at 21.

[35] AAAE Comments at 2.

[36] Collins Aerospace Comments at 7.

[37] CelPlan Comments at 3.

[38] ConvergEX Comments at 2; *see also* Eonti Comments at 3; Selex ES Comments at 2; Telrad Comments at 2; Airtel Comments at 3; Powertech Comments at 4; TELE-WORX Comments at 3.

[39] Similarly, no AeroMACS commenters object to the Forum's proposed responsibilities for the Channel Manager. *See* Petition at 21-22. The Forum thus reiterates that the Commission should initiate the selection process of a Channel Manager simultaneously with the adoption of final service rules for AeroMACS. *See* Forum Comments at 12.

exclude others."[40] This same logic supports the need for impartiality in the Channel Manager. AMT interests agree with ASRI and further suggest a number of modifications to the rules that ultimately would favor the use of AeroMACS by airline users to the detriment of other intended beneficiaries, most notably airport owners and operators.[41] These comments foreshadow the disputes that may arise between differently situated AeroMACS users if impartiality is not one of the eligibility criteria for the Channel Manager.

With that said, the criteria identified by ASRI could play a role in advising the Channel Manager.[42] Specifically, the Forum does not oppose a requirement that the Channel Manager establish an advisory board ensuring industry input regarding its key activities, including the setting of fees, establishment of sharing processes, and other key operating principles. This advisory board might include representatives from the likely AeroMACS user community (including both aircraft operators and airport operators or their representative trade associations), entities with experience managing aviation spectrum, service providers, manufacturers, and other interested parties, including entities well versed in aeronautical communications. The population of this advisory board ultimately could help achieve some of the outcomes identified by ASRI while ensuring the impartiality of the Channel Manager for the benefit of all AeroMACS users.

C. The Record Reflects Support for a Licensed-By-Rule Approach

In its comments, the Forum explained how the *Notice*'s proposed licensing and coordination requirements would impose onerous and unnecessary costs on non-Federal

[40] *See* ASRI Comments at 7-8. Notably, ASRI goes on to suggest a number of qualifying criteria that likely would favor the selection of an entity from the aviation industry. For example, ASRI suggests the Channel Manager should be experienced in coordinating aeronautical frequencies.

[41] *See* infra Section IV.B. (discussing AMT's proposed modifications to the proposed rules for the definition of AeroMACS and the scope of service).

[42] ASRI Comments at 12 (supporting experience in aeronautical communications as an eligibility criterion).

AeroMACS users. The Forum recommended the Commission instead pursue a more flexible licensed-by-rule approach while empowering the Channel Manager to serve as the central source of AeroMACS usage and coordination. Such an approach would best facilitate deployment of AeroMACS systems while also achieving the Commission's objective of being able to quickly identify non-Federal users in the band in the unlikely event of interference.

The overwhelming majority of commenters share the Forum's concerns about the costs and delays that would stem from the *Notice*'s proposed coordination requirements.[43] For example, AEEC states these requirements could "impose unnecessary delays and costs" on deployments and that costs would be passed on to the airlines.[44] The Airports Council similarly notes its "concern[] about the expense and delay associated with individual base station licensing processes."[45] Numerous other commenters share the same fears.[46] In almost every instance, commenters state that the coordination benefits the Commission seeks to achieve through this proposed requirement could be better realized through greater reliance on the third party Channel Manager.

With the exception of a handful of AMT interests, no commenters support the Commission's proposed individual site-based licensing proposal. Instead, the record contains two alternative licensing proposals. The majority of commenters support the licensed-by-rule approach as proposed in the Forum's Petition. As the Forum explained in its initial comments, a licensed-by-rule regime would allow the Commission to achieve its underlying policy objective,

[43] Notably, the only commenters who support such a requirement are AMT interests. *See, e.g.,* AFTRCC Comments at 5-6.

[44] AEEC Comments at 2.

[45] Airports Council at 2.

[46] *See* Ondas Comments at 4; TELE-WORX Comments at 3; Powertech Comments at 4-5; Airtel Comments at 3; Telrad Comments at 3; Selex ES Comments at 2; DigiCert Comments at 3; Eonti Comments at 4; ConvergEX Comments at 3.

which is to quickly identify AeroMACS users in the band in the unlikely event of interference.[47] The best source of information relating to AeroMACS usage will lie with the Channel Manager.[48] The Forum's Petition proposes to require the Channel Manager to demonstrate an ability to register and maintain a database of non-Federal AeroMACS transmitter locations and operational parameters.[49] Thus, to the extent the Commission is concerned about the speed at which information in this database is made available to it or other authorities, it can require the Channel Manager to make this usage information available to Commission staff or other authorities in any rare cases of interference. Such an approach would achieve the Commission's policy objective while minimizing the administrative burdens on. As a result, the Forum urges the Commission to adopt a licensed-by-rule approach.

The second licensing proposal put forth in the record comes from ASRI, who proposes the Commission designate the Channel Manager as the licensee.[50] Under this proposal, the Channel Manager licensee would assign channels to eligible non-federal users.[51] Notably, ASRI provides no compelling justification as to why such an approach is superior to a licensed-by-rule approach. However, while the Forum believes that a licensed-by-rule regime remains preferable, a Channel Manager licensee approach could potentially present a workable solution. Ultimately, the success of such an approach likely would depend on the other actions the Commission takes

[47] *See Notice*, 34 FCC Rcd at 4998 ¶ 37 ("The Commission and any other interested party must be able to quickly identify licensees in the band, especially in cases of interference to critical safety-related air traffic control AeroMACS applications.").

[48] To ensure efficient use of the spectrum at each location, the Channel Manager must be afforded the latitude to reassign channels on an as-needed basis to reflect the geographic or time-based needs of users. Thus, the Channel Manager's database – and not the Commission's Universal Licensing System – will always be the best source of information regarding AeroMACS usage.

[49] *See* Petition at 21.

[50] ASRI Comments at 8.

[51] *Id*.

with respect to this service, including the adoption of flexible eligibility rules for end users and the designation of an impartial, qualified Channel Manager licensee.

D. The Record Reflects Support for More Flexible Eligibility Rules Allowing AeroMACS Communications by a Range of Users, Including Airports, Airline Carriers, and Aeronautical Communications Network Providers

The overwhelming majority of commenters support more flexible eligibility rules.[52] Specifically, commenters identify not only airport owners and operators, but also airline carriers, aeronautical communications network providers, and developmental users, among others, as entities who should be eligible to utilize AeroMACS facilities for communications relating to safety and regularity of flight.[53] Notably, even the American Association of Airport Executives states that the Commission should adopt "a more flexible and expanded approach" that does not make airports responsible for granting other entities permission to AeroMACS channels.[54]

Consistent with this record, the Forum urges the Commission to adopt rules identifying airport owners and operators, airline carriers, aeronautical communications network providers, developmental users, and any others as eligible end users so long as their communications relate to safety and regularity of flight.

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[52] *See* AEEC Comments at 2 ("[T]he proposed rules as written could restrict and limit AeroMACS services unless the airport owner is incentivized to provide such services."); *see also* Selex ES Comments at 1; Ondas Comments at 2.

[53] *See* Airbus Comments at 2 (supporting eligibility for communications network service providers); ConvergEX Comments at 3 (supporting eligibility for airlines, aeronautical communications network providers, manufacturers or prospective AeroMACS users); CelPlan Comments at 3 (supporting eligibility for aeronautical communications network providers, manufacturers, airlines, and aeronautical support service providers); Eonti Comments at 2 (supporting eligibility for airlines, aeronautical communications network providers, and AeroMACS device manufacturers); DigiCert Comments at 2 (supporting eligibility for aeronautical communications network providers); Airtel Comments at 2 (supporting eligibility for developmental users, airlines, and aeronautical communications network providers); Powertech Comments at 2-3 (same); TELE-WORX Comments at 2 (same).

[54] AAAE Comments at 1.

IV. THE COMMISSION SHOULD NOT ALLOW A HANDFUL OF AMT COMMENTERS TO RELITIGATE INTERNATIONALLY-AGREED UPON INTERFERENCE LIMITS AND THE COMMISSION'S PREVIOUS DECISION TO AWARD AEROMACS "PRIORITY OVER AMT SYSTEMS"

In its initial comments, the Forum summarized its efforts to engage with the flight test community on ways to maximize use of the 5091-5150 MHz band without causing harmful interference to AeroMACS.[55] Unfortunately, in comments to the *Notice*, a small handful of commenters from the AMT community suggest a new series of actions that would constrain AeroMACS in a number of ways.[56] Because the Commission previously determined that AeroMACS will have priority over AMT systems in this band, the Commission should reject these arguments.

The Forum continues to engage with members of the flight test community regarding an approach that would be generally applicable to all airports at which AMT operations occur. However, the day may ultimately come when the AMT parties and the Forum inform the Commission that they have not been able to agree on coordination criteria consistent with the internationally agreed-upon requirements contained in Resolution 418 and the FAA's insistence on an AeroMACS priority over AMT. If this occurs, the Commission should adopt rules codifying a requirement instructing the Channel Manager cooperate with AMT users in a manner consistent with the Footnote US444B of the Table of Frequency Allocations.[57]

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[55] Because the *FCC 2017 R&O* did not address the allocation of additional spectrum for AMT operations, there is no allocation for AMT in the 5000-5030 MHz band. *See Amendment of Parts 2, 15, 80, 90, 97, and 101 of the Commission's Rules Regarding Implementation of the Final Acts of the World Radiocommunication Conference (Geneva, 2012) (WRC-12), Other Allocation Issues, and Related Rule Updates*, Report and Order, 32 FCC Rcd 2703, 2705 ¶ 5 (2017) ("*FCC 2017 R&O*").

[56] *See*, *e.g.*, Boeing Comments at 7-16; AFTRCC Comments at 7.

[57] *See* Petition at 19.

A. The History of AeroMACS/AMT Coexistence in the 5091-5150 MHz Band

Discussions relating to the coexistence of AMT and AeroMACS operations in the 5091-5150 MHz band date back to as early as 2005. In that year, the United States submitted a contribution to the International Telecommunication Union, Radiocommunication Sector Working Party 8B examining how to prevent interference from AMT transmitters into AeroMACS systems.[58] The United States offered two methods for preventing such interference. First, the contribution stated that "flight test operations will likely not typically be conducted at [AeroMACS] equipped airports" and thus "geographic separation will be the primary method for" preventing interference to AeroMACS facilities.[59] However, it acknowledged there may be "an unusual situation for a flight test aircraft to operate near an [AeroMACS] equipped airport."[60] In such a situation, interference to AeroMACS "need not be a major concern" because AMT users could employ a second method for preventing interference to AeroMACS.[61] Specifically, "reducing transmitter power when flight test operations occur" near airports would help AMT users avoid "exceeding the interference threshold of the [AeroMACS] equipment."[62] In other words, AMT users would implement power control on flight testing equipment used at airports.[63]

Consistent with this desire to avoid interference to AeroMACS, the Commission subsequently adopted Footnote US444B of the Table of Frequency Allocations setting forth the

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[58] *Preliminary Report on compatibility studies between aeronautical mobile telemetry and FSS and AM(R)S services in the 5091-5150 MHz band*, ITU-R Doc 8B/225-E, at 8 (Sept. 8, 2005).

[59] *Id*.

[60] *Id.*

[61] *Id*.

[62] *Id*.

[63] Initial discussions between the FAA, the Forum, and the AMT community focused – at the suggestion of the FAA – on the implementation of power control for AMT equipment operating in the band to help ensure such operations avoid interference to AeroMACS. Thus, to the extent the Commission deems it necessary to incorporate technical

basis for AeroMACS/AMT sharing of the 5091-5150 MHz band. Footnote US444B was the result of extensive consideration by the Commission and input from Federal users of AeroMACS. Specifically, in the 2012 *WRC-07 NPRM*, the Commission sought comment on a proposal to make the 5091-5150 MHz band available for AeroMACS and AMT.[64] In response, the Aerospace and Flight Test Radio Coordination Council ("AFTRCC") and Boeing asked the Commission to require coordination of AeroMACS with AMT operations at six airports where AMT operations would occur.[65]

The FAA and NTIA opposed this coordination requirement. In its comments to the FCC, NTIA informed the FCC of its position in response to the Boeing and AFTRCC coordination proposal:

> This is a new constraint that was not considered in the International Telecommunication Union Radiocommunication (ITU-R) sector studies in preparation for WRC-07 or WRC-12. Since there is no established framework for the proposed coordination, ***AMT operations could constrain the deployment of AeroMACS at the six airports specified by AFTRCC and Boeing, which is not acceptable to the FAA.***[66]

The NTIA Priority Letter subsequently recommended the language establishing a priority for AeroMACS over AMT systems in the band.[67] In addition, it recommended that AMT transmissions be limited to those from aircraft that meet internationally agreed-upon protections

parameters for aeronautical mobile telemetry in the Part 87 rules, the Forum would not object. *See* Forum Comments at 23.

[64] *See Amendment of Parts 1, 2, 15, 74, 78, 87, 90, and 97 of the Commission's Rules Regarding Implementation of the Final Acts of the World Radiocommunication Conference (Geneva, 2007) (WRC-07), Other Allocation Issues, and Related Rule Updates*, Notice of Proposed Rulemaking and Order, 27 FCC Red 14598, 14626 ¶ 65 (2012) ("*WRC-07 NPRM*").

[65] *See* AFTRCC Comments in Response to *WRC-07 NPRM*, ET Docket No. 12-338, at 5 (Feb. 25, 2013); Boeing Comments in Response to *WRC-07 NPRM*, ET Docket No. 12-338, at 4 (Feb. 25, 2013).

[66] *See* Letter from Paige R. Atkins, Associate Administrator, Office of Spectrum Management, NTIA, to Julius P. Knapp, Chief, Office of Engineering and Technology, FCC, ET Docket No. 12-338, at 2 (filed Feb. 11, 2015) ("NTIA Priority Letter") (emphasis added).

[67] *Id.*

for AeroMACS that are set forth in ITU Resolution 418 (Rev. WRC-12).[68] The FCC subsequently codified both of these recommendations in footnote US444B.[69]

When considering the arguments of the AMT commenters, the Commission must keep this history in mind.

B. Proposals from a Small Handful of AMT Commenters Would Constrain AeroMACS in Numerous Ways

Turning a blind eye to this history, a small number of AMT commenters suggest a series of proposals designed to constrain the deployment of AeroMACS networks, the scope of communications permitted over AeroMACS facilities, and the number of end users eligible to enjoy AeroMACS services. A closer look at these proposals makes clear that the Commission should reject them outright.

First, the AMT commenters suggest precluding AeroMACS operations at those airports where AMT operators occur.[70] These arguments blink reality. As discussed above, the Commission recently rejected proposals by the AMT community that would require advance coordination of AeroMACS at the six airports that had been identified as supporting significant flight testing activities. Undeterred, these AMT commenters double down, proposing the Commission preclude AeroMACS operations at a minimum of fifteen airports.[71] None of the AMT commenters identify the length of time for which AeroMACS would be precluded,

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[68] *Id.*

[69] *Amendment of Parts 1, 2, 15, 25, 27, 74, 78, 80, 87, 90, 97, and 101 of the Commission's Rules Regarding Implementation of the Final Acts of the World Radiocommunication Conference (Geneva, 2007) (WRC-07), Other Allocation Issues, and Related Rule Updates*, Report and Order, Order, and Notice of Proposed Rulemaking, 30 FCC Rcd 4183, 4209 ¶ 59 (2015).

[70] *See, e.g.*, Boeing Comments at 14.

[71] Notably, the three AMT commenters provide three separate lists of airports at which they claim AMT operations occur. Over the course of the last two years, the Forum has never received a consistent list of airports at which AMT testing will occur.

suggesting that AeroMACS would be precluded indefinitely at these airports.[72] Moreover, as the Forum explained in its comments,[73] delaying implementation at even a small handful of airports would have negative repercussions throughout America's airports due to the importance of network effects to the AeroMACS service.[74] Indeed, even the prospect of such a delay could yield uncertainty that would dampen investment in this emerging technology.

Next, Boeing offers a series of suggestions aimed at restricting the scope of communications permitted over AeroMACS networks. Specifically, Boeing suggests a modification to the proposed definition of AeroMACS. The modification would narrow what constitutes AeroMACS safety communications from the Commission's proposal (*i.e.*, safety communications "supporting airport surface applications") to only those safety communications supporting flight. With respect to the proposed rule on the scope of service, Boeing suggests limiting the third category of permitted AeroMACS applications to only those communications related to airport operations impacting the safety of aircraft.[75] By comparison, the Commission proposes this third category to include communications related "to airport operations, safety, and security."[76] Boeing offers virtually no support for these modifications. Moreover, these limitations run counter to the types of applications identified by the FAA and the National

[72] Boeing states that it has not performed the requisite testing to determine "critical technical questions." Boeing Comments at 15.

[73] *See* Forum Comments at 21.

[74] For example, if AeroMACS deployments were delayed at an airport served by American Airlines, American Airlines may see less value in deploying AeroMACS on its planes. In turn, other airports served by American Airlines may see less value in deploying AeroMACS at their airports. In turn, airlines serving those other airports may see less value in deploying AeroMACS on their planes. Thus, in effect, delaying AeroMACS deployment even at one airport could be the equivalent of pulling the string that unravels the entire AeroMACS cloth during these nascent stages of this technology.

[75] *See* Boeing Comments at 9-10. The three general category of applications proposed by the Commission include Air Traffic Services (ATS), including Air Traffic Control (ATC) and Air Traffic Management (ATM); Aeronautical Operations Communications (AOC); and communications related to airport operations, safety, and security.

[76] *Notice*, 34 FCC Rcd at 5014; 47 C.F.R. § 87.601.

Aeronautical and Space Administration for airport operators and owners.[77] Ultimately, these modifications would have significant deleterious effects on the benefits afforded by AeroMACS networks to airport owners and operators. The *Notice* recognizes airport owners and operators are a key expected beneficiary of AeroMACS, and the final rules should reflect this as well.

Boeing further proposes to limit significantly the entities eligible to utilize AeroMACS services. Specifically, Boeing baldly asserts that potential non-aircraft users of AeroMACS should be required to make a showing demonstrating its "knowledge of aeronautical safety communications pertaining to the safe and efficient operation of aircraft and ground services in support of aircraft."[78] Boeing neither explains the rationale for such a restrictive eligibility rule nor offers any details as to how such a rule might be implemented. Moreover, its proposal would introduce yet another barrier and additional uncertainty for potential beneficiaries of AeroMACS. At its core, this proposal is a thinly-veiled attempt to dampen usage of the AeroMACS service, most notably once again to the detriment of airport owners and operators.

In sum, while the WiMAX Forum appreciates Boeing's repeated recognition of the significant public interest that exists for AeroMACS,[79] the latest proposals from Boeing and two of its trade associations would further constrain the availability, scope, and beneficiaries of AeroMACS communications with no corresponding benefits. The Commission thus should reject these proposals.

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[77] *See, e.g., Access to SWIM*, at 10 (noting public safety and real time reporting applications that might not be permitted under Boeing's proposed modifications); James M. Budinger & Edward Hall, *Aeronautical Mobile Airport Communications System (AeroMACS)*, at 1, Section 1.1, NASA (Oct. 2011), https://ntrs.nasa.gov/archive/nasa/-casi.ntrs.nasa.gov/20110022433.pdf (noting public safety, security, fire and rescue applications that might not be permitted under Boeing's proposed modifications).

[78] Boeing Comments at 12.

[79] *See id*. at ii; Boeing Petition Comments, RM-11793, at 10 (Aug. 18, 2017) ("Boeing supports the deployment of AeroMACS at airports in the United States in order to enhance the safety and efficiency of aircraft operations.").

C. Consistent with the FAA and NTIA's Request, the Impartial Channel Manager Will Facilitate "the Exchange of Information About Planned Deployments" Between AeroMACS and AMT Users

In contrast to the efforts of a small handful of AMT commenters to relitigate the AeroMACS priority over AMT systems, the Forum's Channel Manager proposal conforms to the Commission's current rules and is overwhelmingly supported in the record. Specifically, NTIA requested and the FCC adopted footnote US444B(c) to the U.S. Table of Frequency Allocations, which states in relevant part that AeroMACS operators and AMT systems "are urged to cooperate with one another in the exchange of information " about planned deployments at those airports where AMT operations occur.[80] The rules proposed in the Petition cite to this footnote,[81] and the flexibility inherent in the proposed Channel Manager approach will afford for this cooperation to occur.

Consequently, if the Forum and AMT parties ultimately are unable to agree on coordination criteria consistent with the internationally agreed-upon requirements contained in Resolution 418 and the FAA's insistence on an AeroMACS priority over AMT, the Commission should adopt final rules instructing that the "Channel Manager is urged to cooperate with [AMT] users in accordance with Table of Frequency Allocations footnote US444B(c)."[82]

V. CONCLUSION

The record in response to the *Notice* reiterates the significant support for the proposals contained in the Forum's Petition. Indeed, an overwhelming majority of commenters again reiterate the need for a flexible, light-touch regulatory approach for this service. To implement the views expressed in this record, the Commission should adopt rules that:

[80] *See* NTIA Priority Letter at 2.

[81] *See* Petition at 4-A (proposed Section 87.606(b)).

[82] *See id.*

- Utilize a single, nationwide Channel Manager to maximize the efficient, consistent, and effective use of AeroMACS frequencies;
- Identify eligibility criteria for the Channel Manager;
- Employ a licensed-by-rule approach; and
- Allow for AeroMACS communications by a range of users, including airports, airlines, and aeronautical communications network providers.

The Commission should not, however, be distracted by proposals from a small handful of AMT commenters who seek a "re-do" of the Commission's carefully considered approach for introducing AeroMACS. The Forum continues to engage with members of the flight test community regarding an approach to cooperation that would be generally applicable to all airports at which AMT operations occur. However, in lieu of presenting suggestions on how to facilitate such cooperation, these AMT commenters propose a series of road blocks designed to constrain AeroMACS services. The Commission should reject these proposals.

Respectfully submitted,

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